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Elbow Flexion and Extension Rehabilitation Exercise System Using Marker-less Kinect-based Method

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ABSTRACT

This paper presents the elbow flexion and extension rehabilitation exercise system using marker-less Kinect-based method. The proposed exercise system is developed for the upper limb rehabilitation application that utilizes a low cost depth sensor. In this study, the Kinect skeleton tracking method is used to detect and track the joints of upper limb and then measure the angle of the elbow joint. The users perform the exercise in front of the Kinect sensor and the computer monitor. At the same time, they can see the results that displayed on the screen in real-time. The measurement of elbow joint angles are recorded automatically and has been compared to the reference values for the analysis and validation. These reference values are obtained from the normal range of motion (ROM) of the elbow. The results show the average flexion angle of the elbow joint that achieved by the normal user is 139.1° for the right hand and 139.2° for the left hand. Meanwhile, the average extension angle is 1.72° for the right hand and 2.0° for the left. These measurements are almost similar to the standard range of motion (ROM) reference values. The skeleton tracking works well and able to follow the movement of the upper arm and forearm in real-time.

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